Engineer Research and Development Center

Fact Sheet:

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CERL'S BLAST NOISE PROPAGATION RESEARCH PROGRAM

The Problem

The U.S. Army Construction Engineering Research Laboratories' (CERL) blast noise prediction computer program (BNOISE) is used to produce noise contours for Army installations. These noise contours are then used in the Installation Compatible Use Zone (ICUZ) land management program, which identifies areas that are, or will be, impacted by noise. Researchers need to improve the prediction sensitivity to changes in weapon size, vegetation, weather, and terrain.

The Technology

Recent studies have been performed to refine the blast noise prediction program. CERL researchers have clarified the role of shock wave decay in blast noise propagation and have examined the effect of the ground surface on blast noise measurements. The results of this latter study indicated that small scale tests failed to predict the full scale decay rate accurately. The study also provided guidance to CERL researchers on how to design blast noise measurements that will minimize errors due to surface effects.

CERL is working with the University of Illinois on the Fast Field Program (FFP). This program predicts the effects of wind and temperature on blast noise propagation.

A useful computer program, BlastMap, has been developed to enable environmental engineers to predict noise environments expected from weapons firing using some simple, real-time meteorological measurements and an extensive, computer-archived, lookup table of pre-calculated solutions of the FFP algorithm.

Benefits/Savings

The BlastMap program will provide a more complete understanding of how to use noise contours in the scheduling and planning of training activities. This can help lead to the reduction of bothersome noise around installations.

Status

CERL has conducted extensive testing. Unique, controlled experimental tests of blast noise propagation were performed at Fort Carson, CO; Fort Bliss, TX; Aberdeen Proving Ground, MD; and Fort Leonard Wood, MO.

The data from Fort Bliss and Aberdeen Proving Ground were compared to predictions made by the FFP for nine classes of weather profiles. The agreement is excellent (within five decibels) at short range and in downward refracting conditions where the sound waves are bent back toward the ground. At distances greater than five kilometers and in upward refraction in which the sound waves are bent away from the surface, the agreement is somewhat poorer. Comparison of the data for the larger charge sizes is now being performed.

The data from Fort Leonard Wood show more attenuation than any of the other data sets. To date, rough surface effects have not been sufficient to explain the extra attenuation. Work is now underway to include the effects of sound absorption and scattering by trees and variable terrain into the predictive model to explain this effect.

Point of Contact

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